

ENGR 120: ENGINEERING COMPUTATION

Lab 1

Microsoft Excel – Part I

1. Introduction

Microsoft Excel allows you to create professional spreadsheets and charts. It performs numerous functions and formulas to assist you in your projects. This tutorial will help you get started with Microsoft Excel and may solve some of your problems, but it is a very good idea to use the Help Files that come with Microsoft Excel, or go to Microsoft's web site located at <http://microsoft.com/office/excel/default.htm> for further assistance. In EXCEL, the file you are working on is called a workbook. It contains various **worksheets**. Each worksheet is divided into columns (named A, B, C,...) and rows (numbered 1, 2, 3...) . The intersection of each row and column is a cell (named A1, A2,..., B1, ...) Each cell can contain **space, a text, a number or a formula**. A simple worksheet is shown in **Fig. 1**.

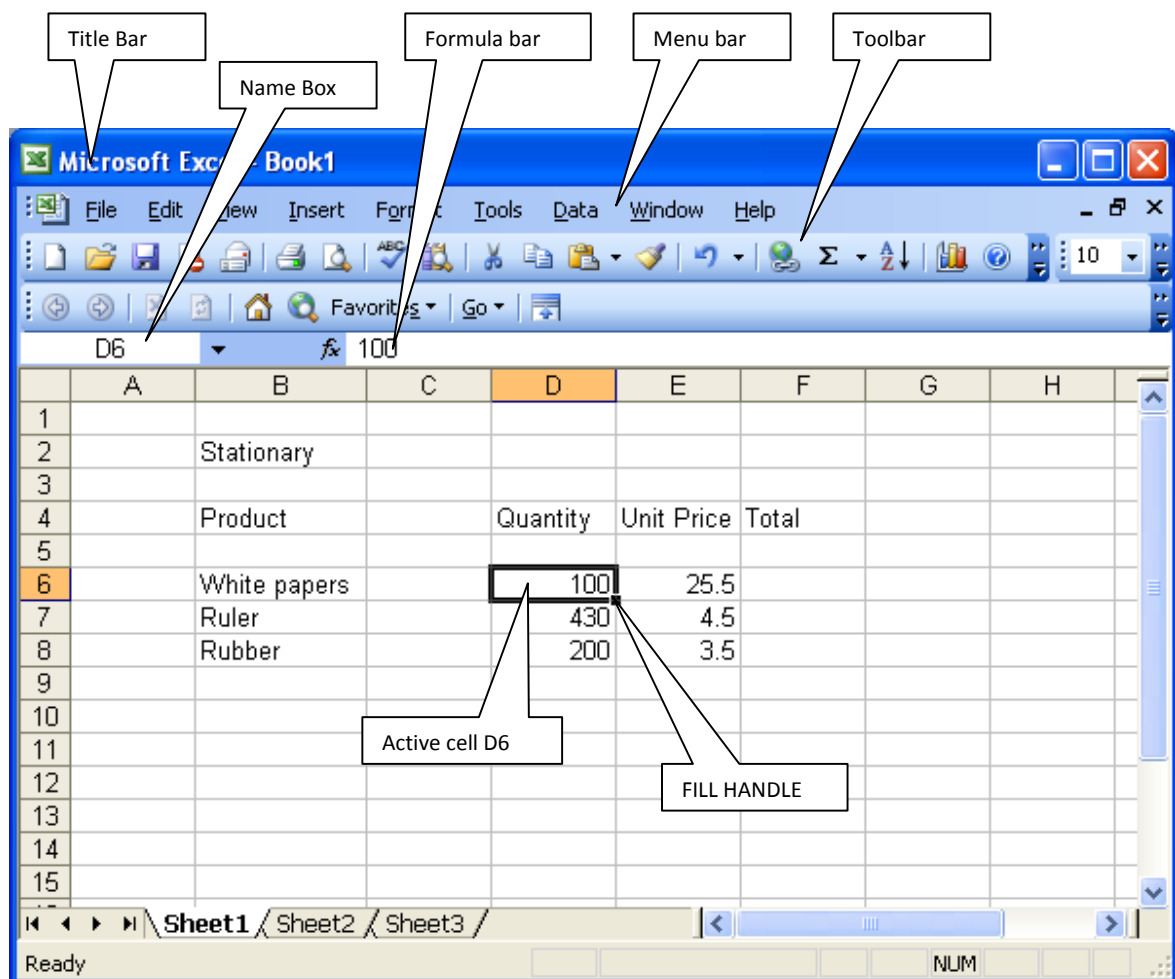


Fig. 1. A simple worksheet

2. Writing Formulas

The key part of Excel is the formulas. Formulas begin with an equal sign. Open the Microsoft Excel, write the data shown in **Fig. 1** and save the workbook as Book1. To **compute the total price** for the product white papers, it is the product of the quantity D6 and the unit price E6.

1. Position cursor at cell F6, write = sign.
2. Click on cell D6 (quantity of white papers).
3. Write * sign.
4. Click on cell E6 (unit price of white papers).
5. Press enter (=D6*E6 will be written in the formula bar).

To write a formula

1. Activate the required cell.
2. Write = sign.
3. Click on the cells included in the formula separate cell names by the arithmetic operators (+addition, -minus, * multiplication, / division, ^ exponentiation, and % percent). As you proceed, your formula is written in the formula bar.
4. Press Enter.

- **Copying cells using Copy**

To evaluate the total for the other product, you don't have to rewrite the formulas in cells F7 and F8. We can just copy the content of F6.

1. Activate F6.
2. Select Copy from Edit menu, or right click the mouse and select Copy.
3. Mark with the area in which the formula is to copied (F7 to F8).
4. Press Enter.

- **Copying cells Using FILL HANDLE**

The FILL HANDLE is the small square at the bottom right of the active cell.

1. Activate the cell to be copied.
2. Move the mouse on the Fill handle.
3. Press down and drag over the cells to be filled.
4. Leave the mouse button, the equation is copied.

- **Completing the worksheet**

1. Evaluate column G Sales tax for each product =0.05 * total.
2. Evaluate column H Cost for each product= total + Sales tax.
3. Evaluate the total for columns F, G, and H(Total, Sales tax, and Cost). **Fig. 2** shows the sheet1 after completion.

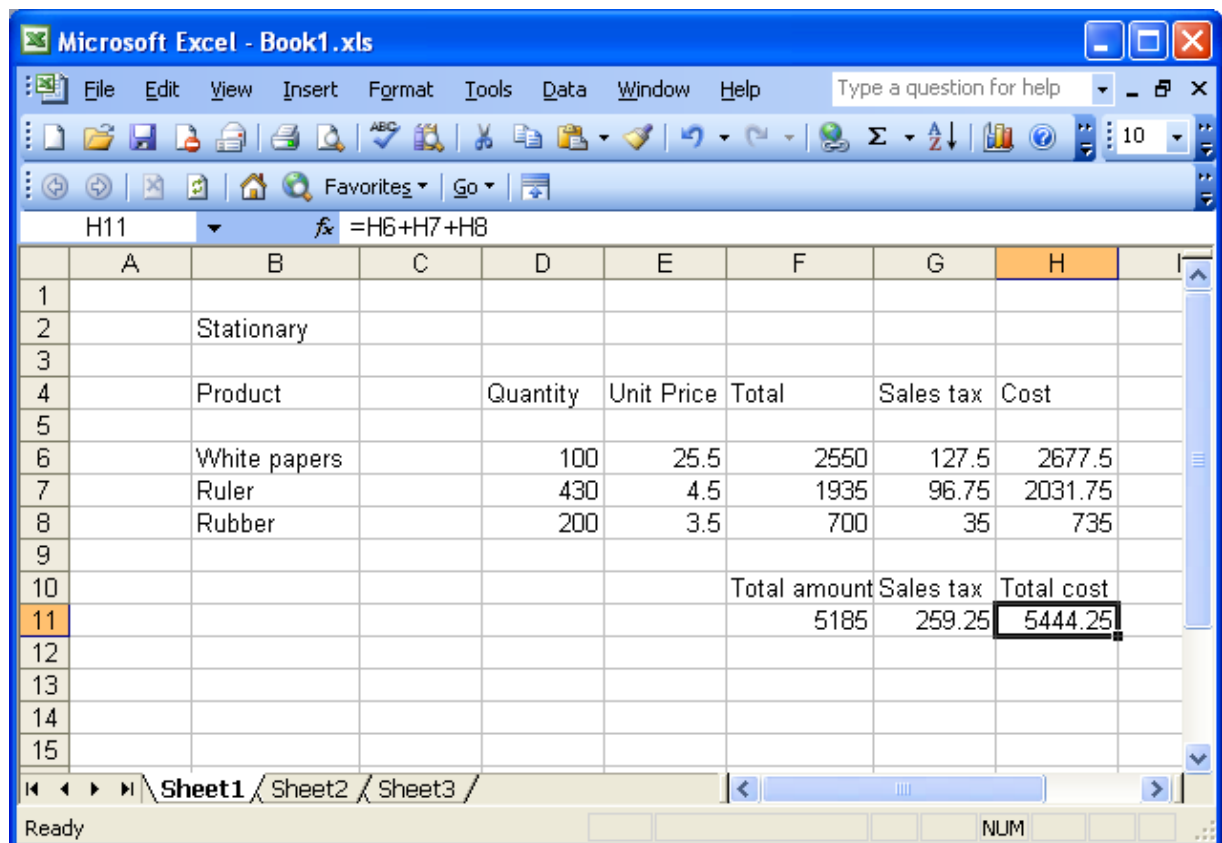


Fig. 2. Referencing the cells in MS-Excel

3. Using Functions

There are hundreds of built-in functions in Excel. The most common are

SUM	Calculates the sum of a list of values.
AVERAGE	Calculates the average of a list of values.
COUNT	Counts how many numbers are in a list.
MAX	finds the largest value in a list.
MIN	Finds the smallest value in a list.

Also Statistical, Mathematical, Trigonometric, Engineering, and Financial functions are available. **Fig. 3** is a worksheet for the monthly sales by region for the first half of the year.

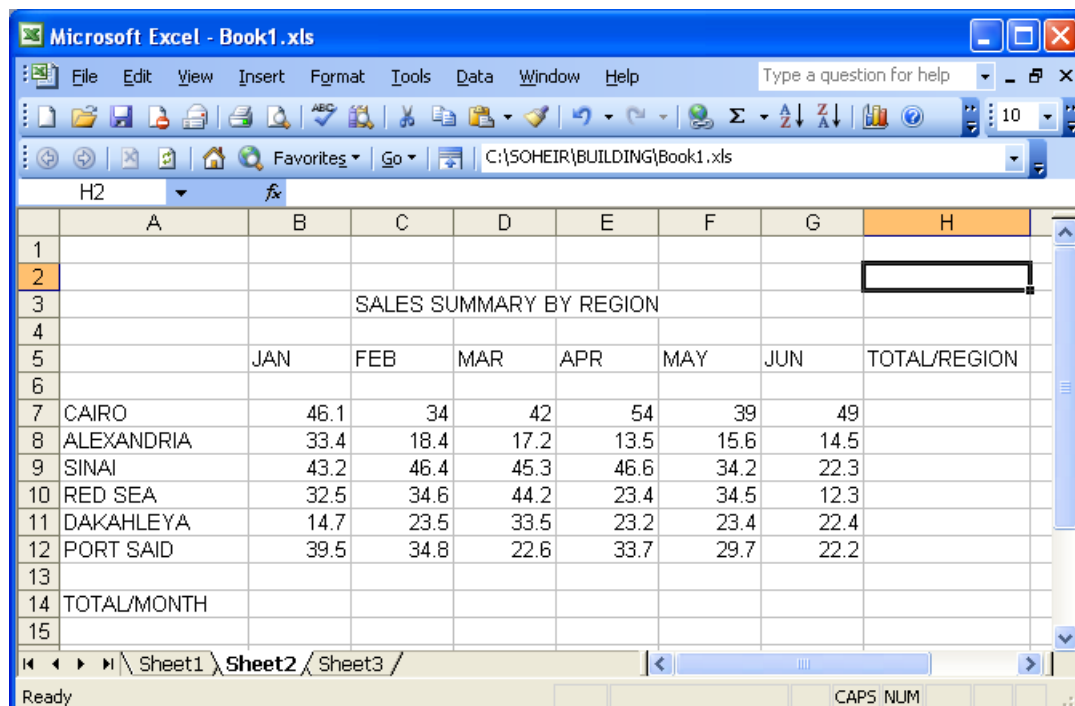


Fig. 3. An Excel worksheet that shows the monthly sales by region

- Write the data shown in **Fig. 3** in sheet2 in workbook book1.

3.1 Using the AUTOSUM tool

- Activate the cell H7.
- Click on Σ from the toolbar, select Sum.
- Use the mouse to Mark the range of cells to be used by the Σ .
- Press enter

- Evaluate in column H the TOTAL/region.
- Evaluate in row 14 the TOTAL/month.

3.2 Using other functions

To get average/month activate cell B15.

- Select Function from the Insert menu, you get the Insert Function window. **Fig. 4**

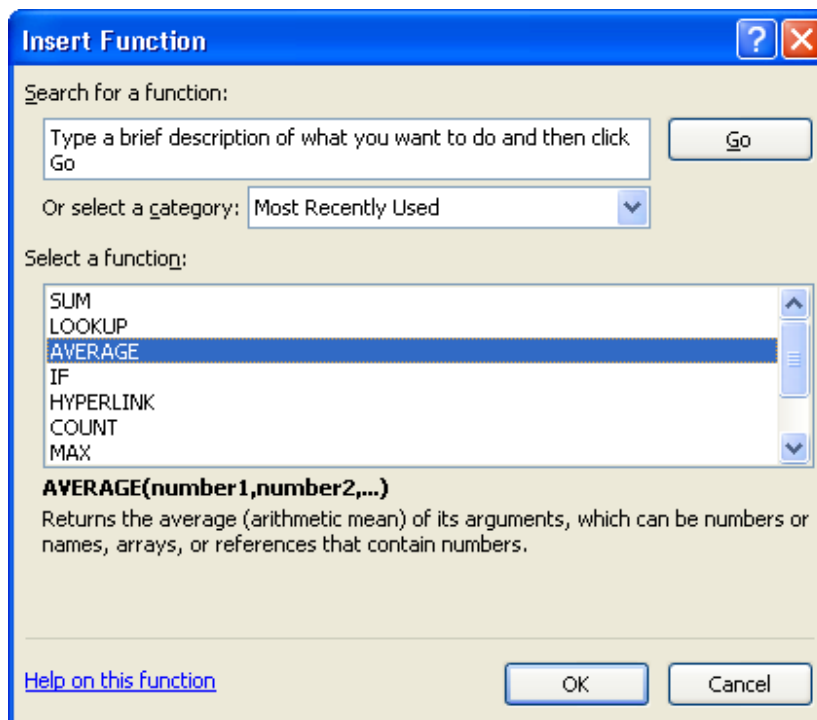


Fig. 4. Selecting the Excel function dialog box

- Select the function AVERAGE, press OK.
- Specify the data to be averaged, in Function Arguments window, **Fig. 5.**
- The arguments may be a range of cells from B7:G7 as shown, or a list of cells separated by comma.B7, C7, D7, E7, F7, G7.
- press OK.

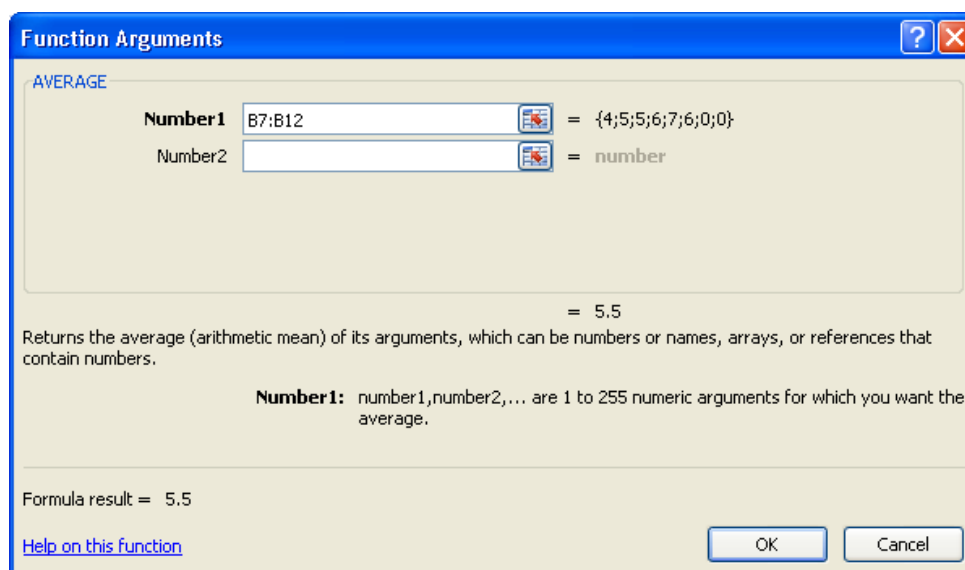


Fig. 5. Entering the function arguments

- Evaluate in column I the Average/region.
- Evaluate in row 15 the Average /month.
- Evaluate in column J the Maximum/region.
- Evaluate in row 16 the Maximum /month.
- Evaluate the ANNUAL SALES (**Fig. 6**).

The screenshot shows an Excel spreadsheet titled 'Microsoft Excel - Book1.xls'. The active sheet is 'Sheet2'. The table contains sales data for various regions over six months (January to June). The columns are labeled A through I. The rows are numbered 1 through 19. The table structure is as follows:

	A	B	C	D	E	F	G	H	I
1									
2									
3			SALES SUMMARY BY REGION						
4									
5		JAN	FEB	MAR	APR	MAY	JUN	TOTAL/REGION	Average/re Ma
6									
7	CAIRO	46.1	34	42	54	39	49	264.1	44.01667
8	ALEXANDRIA	33.4	18.4	17.2	13.5	15.6	14.5	112.6	18.76667
9	SINAI	43.2	46.4	45.3	46.6	34.2	22.3	238	39.66667
10	RED SEA	32.5	34.6	44.2	23.4	34.5	12.3	181.5	30.25
11	DAKAHLEYA	14.7	23.5	33.5	23.2	23.4	22.4	140.7	23.45
12	PORT SAID	39.5	34.8	22.6	33.7	29.7	22.2	182.5	30.41667
13									
14	TOTAL/MONTH	209.4	191.7	204.8	194.4	176.4	142.7		
15	average/month	34.9	31.95	34.13333	32.4	29.4	23.78333		
16	max/month	46.1	46.4	45.3	54	39	49		
17									
18						ANNUAL SALES		1119.4	
19									

Fig. 6. Using the Excel functions

4. Formatting Cells

You can select font, color, pattern, borders, and alignment of cells as in any office application. To format number format:

- Select range of numbers to be formatted.
- Select Cells from Format menu or right click the mouse and select Format Cells (**Fig. 7**).
- Select Number, Specify the Decimal places, Press OK.

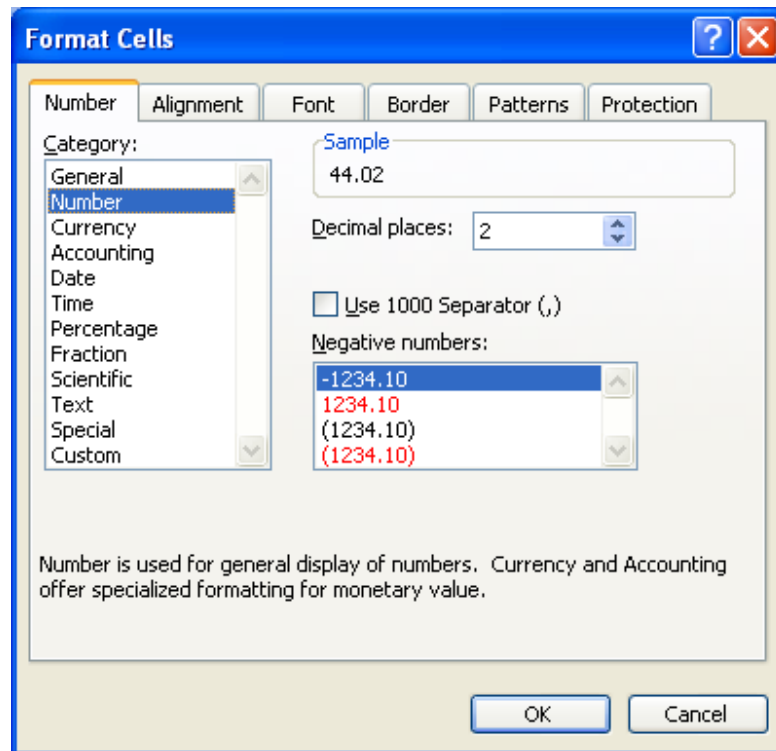


Fig. 7. Format cells dialog box

5. Autofilling Data

An interesting feature of Fill allows us to automatically create a series of values. (e.g. if you want to fill in sheet3 column A by a serial number from 1 to 10 by step 1). Write in cells A4 and A5 the values 1 and 2, then select them. (**Fig. 8**).

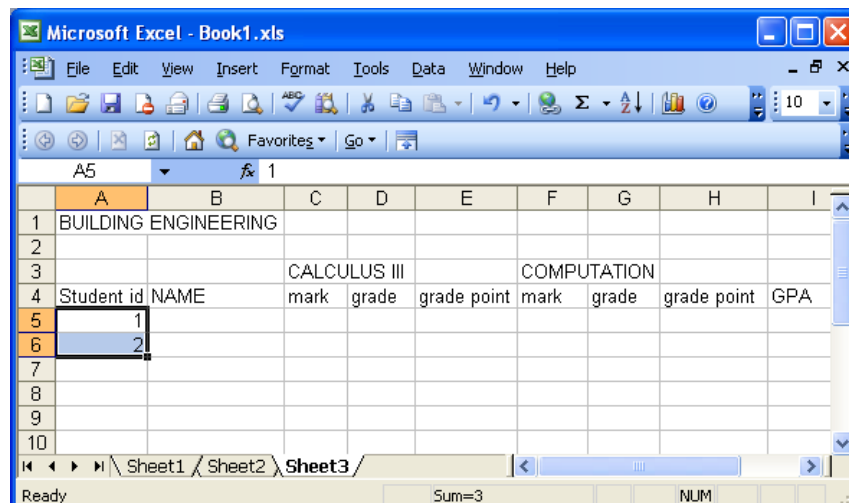


Fig. 8 Auto filling the cells data

Use the FILL HANDLE to mark the range to be filled by a serial number Complete the data as shown in **Fig. 9**.

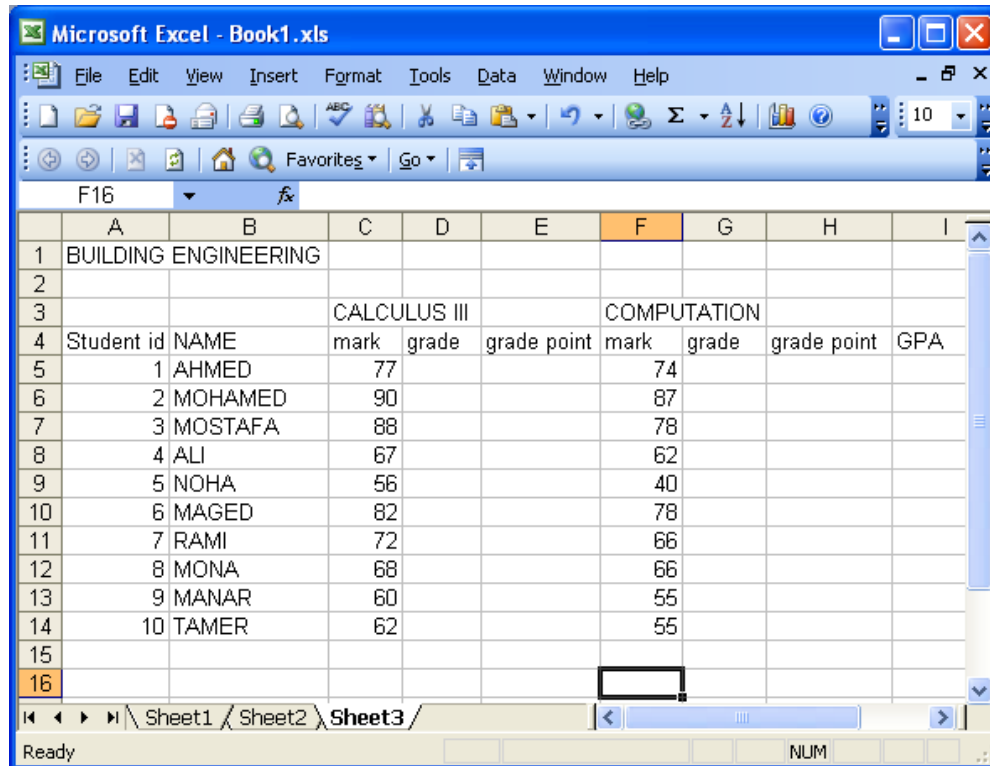


Fig. 9. Finalizing the autofill operation

6. Converting Between Number Systems

There are several functions located in the Engineering category of the set of functions in Excel that can be used to deal with number systems; the following is a set of function that can be used to convert among different number systems:

BIN2DEC Converts binary number into the corresponding decimal number.

BIN2HEX Converts binary number into the corresponding hexadecimal number.

BIN2OCT Converts binary number into the corresponding octal number (octal number system is a number system that has a base of 8).

DEC2BIN Converts decimal number into the corresponding binary number.

DEC2HEX Converts decimal number into the corresponding hexadecimal number.

DEC2OCT Converts decimal number into the corresponding octal number.

HEX2BIN Converts hexadecimal number into the corresponding binary number.

HEX2DEC Converts hexadecimal number into the corresponding decimal number.

HEX2OCT Converts hexadecimal number into the corresponding octal number.

OCT2BIN Converts octal number into the corresponding binary number.
OCT2DEC Converts octal number into the corresponding decimal number.
OCT2HEX Converts octal number into the corresponding hexadecimal number.

Each of these functions takes two arguments; the first is the number to be converted while the second is the number of places to which the converted number will be displayed. The number of places should not exceed 10.

7. IF Function

To evaluate grade an if function is used; it takes the following form:

=if(condition, value_if_true, value_if_false)

If you want to give the cell D5 the value Pass or Failed according to the value of C5. Activate D5, select Function from Insert menu, select if, complete the function arguments as shown in **Fig. 10** . press OK.

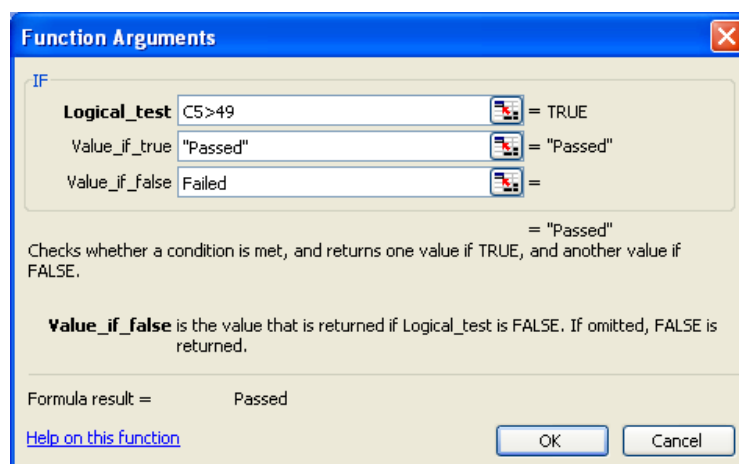


Fig. 10. Entering function argument

The equivalent if function is =if(C5>49,"Passed","Failed")

The following table gives the grade for different marks.

Mark	grade	grade point
Greater than 89	A	4
From 75 to 89	B	3
From 60 to 74	C	2
From 50 to 59	D	1
Less than 50	F	0

In this case a nested if is used

- Activate cell D5 and write the following if function:

=IF(C5>89,"A",IF(C5>74,"B",IF(C5>59,"C",IF(C5>49,"D","F"))))

- Copy the content of D5 to G5.
- Use FILL HANDLE to complete sheet3 as shown in **Fig. 11**.

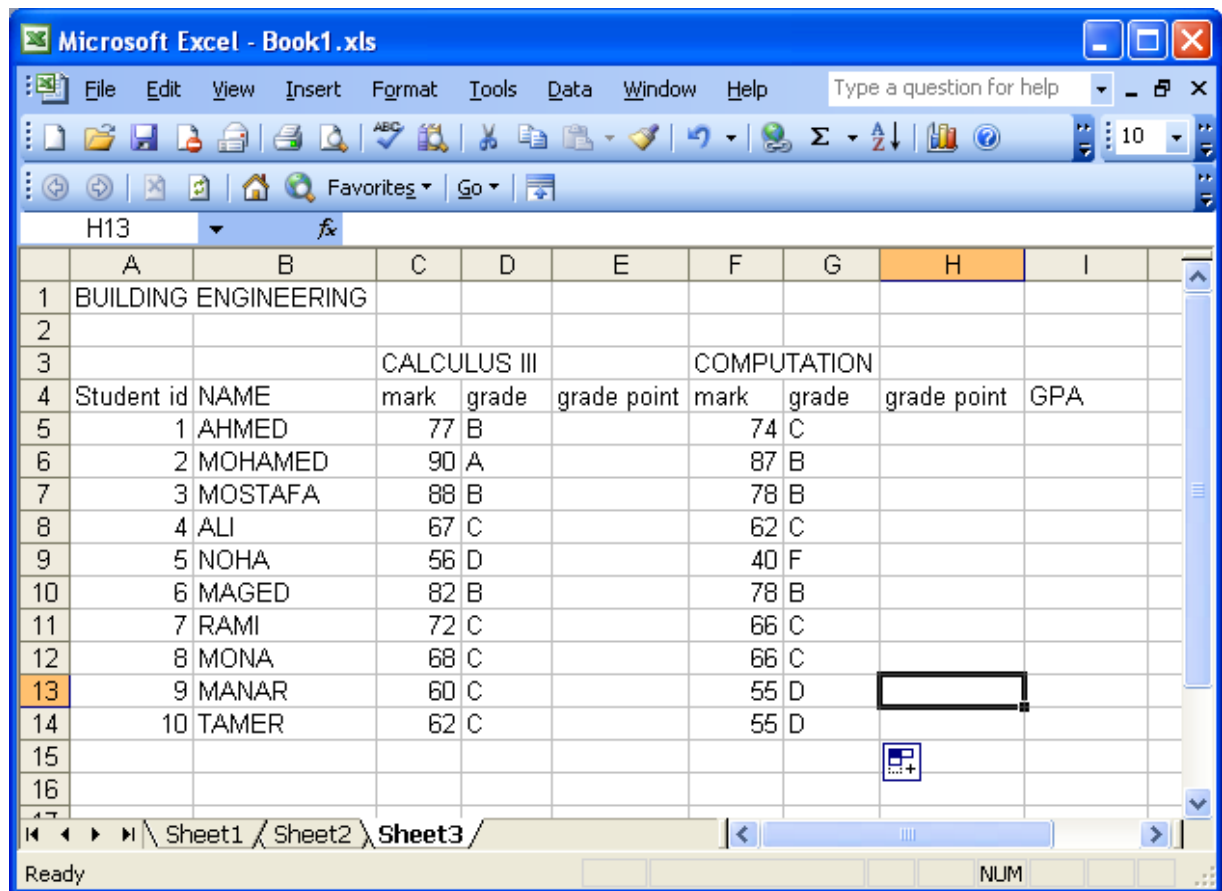


Fig. 11. Using the fill handle

The grade points in column E and H can be obtained by using if function:

- Activate cell E5 and use the following **if** function:

=IF(C5>89,4,IF(C5>74,3,IF(C5>59,2,IF(C5>49,1,0))))

- Copy the content of E5 to H5.
- Use FILL HANDLE to complete the column E and H.

GPA is =(E5*3+H5*3)/6. Use FILL HANDLE to complete sheet3 (**Fig. 12**)

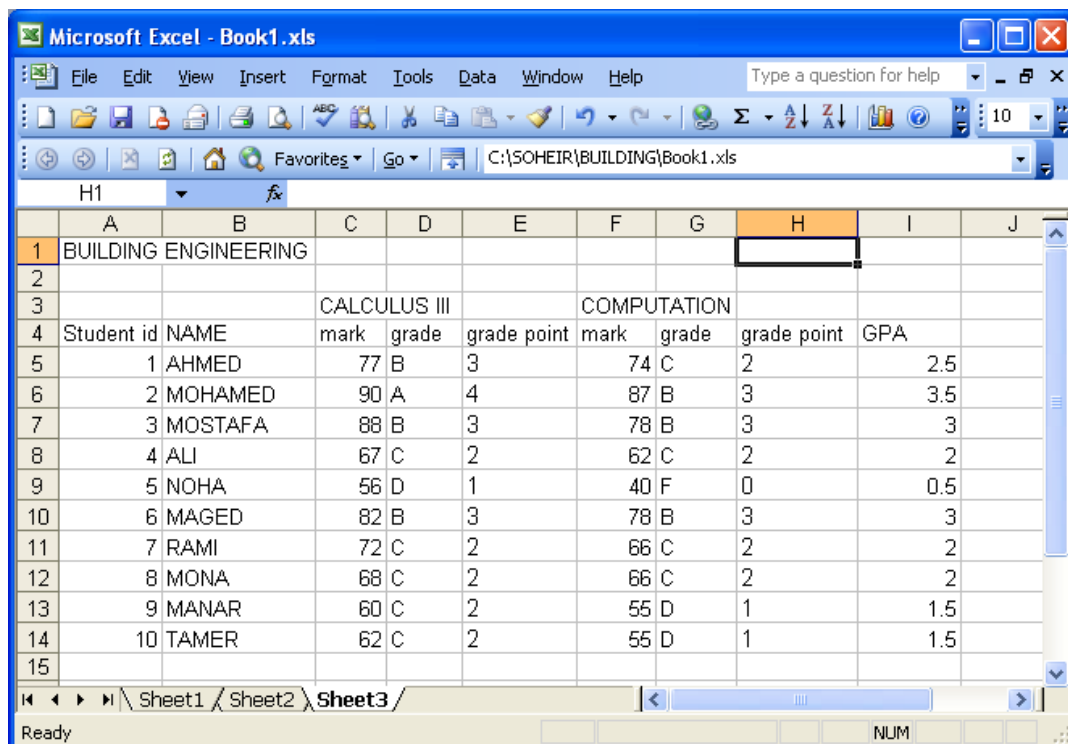


Fig. 12. Completing the fill operation

8. Lookup Function

Create a new workbook book2. Copy the data of **Fig. 9**. The following table gives the letter grade and grade point for different mark ranges.

Mark	Grade	Grade point
>=95	A	4.0
90-94	A-	3.7
85-89	B+	3.3
80-84	B	3.0
75-79	B-	2.7
70-74	C+	2.3
65-69	C	2.0
60-64	C-	1.7
55-59	D+	1.3
50-54	D	1.0
<50	F	0.0

In this case 11 conditions should be tested. Lookup function may be used. The following LOOKUP function tests the value of cell C5, the first list between braces specify the range to be tested, the first range is from 0 to < 50, the second range is from 50 to <55, and so on. The second list is the value corresponding to each range. "F" corresponds to the first range (from 0 to < 50) and so on.

```
=LOOKUP(C5, {0,50,55,60,65,70,75,80,85,90,95},
{"F","D","D+","C-","C","C+","B-","B","B+","A-","A"})
```

To evaluate grade points a second Lookup function is used:

```
=LOOKUP(C5,{0,50,55,60,65,70,75,80,85,90,95},
{0.0,1.0,1.3,1.7,2.0,2.3,2.7,3.0,3.3,3.7,4.0})
```

Complete the worksheet as shown in **Fig. 13**.

	A	B	C	D	E	F	G	H	I
1	BUILDING ENGINEERING								
2									
3			CALCULUS III			COMPUTATION			
4	Student id	NAME	mark	grade	grade point	mark	grade	grade point	GPA
5	1	AHMED	77	B-	2.7	74	C+	2.3	2.5
6	2	MOHAMEI	90	A-	3.7	87	B+	3.3	3.5
7	3	MOSTAFA	88	B+	3.3	78	B-	2.7	3
8	4	ALI	67	C	2	62	C-	1.7	1.85
9	5	NOHA	56	D+	1.3	40	F	0	0.65
10	6	MAGED	82	B	3	78	B-	2.7	2.85
11	7	RAMI	72	C+	2.3	66	C	2	2.15
12	8	MONA	68	C	2	66	C	2	2
13	9	MANAR	60	C-	1.7	55	D+	1.3	1.5
14	10	TAMER	62	C-	1.7	55	D+	1.3	1.5
15									
16									

Fig. 13. Using the lookup function

9. Sorting Data

Excel offers the facility to sort rows in the worksheet ascending or descending order by one or more criteria.

- Select the range of cells to be sorted.
- On the Data menu, click Sort (**Fig. 14**).

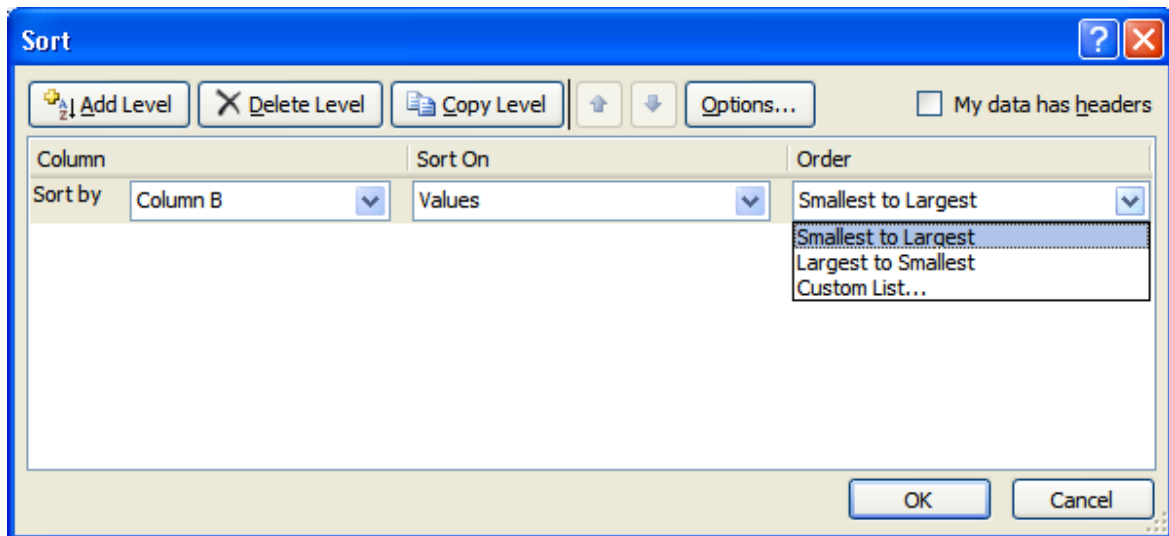


Fig. 14. Sorting function dialog box

In the Sort by clicking on the columns you want to sort according to it value. Specify the Order (smallest to Largest ..), and then click OK.